In the Claims

Claims 1-16 (Cancelled)

Claim 17 (Currently amended): A method of targeting a stem cell to a target tissue in a human or non-human animal subject, the method comprising administering to the target tissue ~~the~~ a composition ~~of claim 1~~ comprising:

(a) a first polynucleotide comprising:

(1) a gene switch/biosensor comprising a nucleic acid sequence encoding a physiological stimulus-sensitive chimeric transactivator, and

(2) an operatively linked tissue-specific promoter; and

(b) a second polynucleotide comprising a nucleic acid sequence encoding a stem cell-attracting chemokine.

Claim 18 (Previously presented): The method of claim 17, wherein the composition is administered to host cells by a delivery method selected from the group consisting of microinjection, electroporation, calcium phosphate transfection, DEAE dextran transfection, polylysine conjugates, receptor-mediated uptake system, liposomal delivery, lipid-mediated delivery system, matrix-impregnated delivery system, microparticle encapsulation, intra-cellular targeting ligand, virion-like particles, and viral vectors.

Claim 19 (Previously presented): The method of claim 17, wherein the target tissue is selected from the group consisting of heart, bone marrow, blood, brain, blood vessels, spinal cord, peripheral nerve, skeletal muscle, cornea, retina, lungs, liver, and pancreas.

Claim 20 (Previously presented): The method of claim 17, wherein said administering comprises administering the composition to host cells *in vitro* and subsequently administering the host cells to a subject.

Claim 21 (Previously presented): The method of claim 17, wherein said administering comprises administering the composition to cells of the target tissue *in vivo*.

Claim 22 (Previously presented): The method of claim 17, wherein following said administering, the nucleic acid sequence encoding the stem cell-attracting chemokine is expressed in the target tissue, and wherein the chemokine attracts endogenous stem cells or endogenous progenitor cells to the target tissue.

Claim 23 (Previously presented): The method of claim 17, wherein said method further comprises co-administering stem cells to the target tissue.

Claim 24 (Previously presented): The method of claim 17, wherein said method further comprises administering an agent that causes stem cells to migrate to the target tissue.

Claim 25 (Previously presented): The method of claim 17, wherein the target tissue is damaged.

Claim 26 (Previously presented): The method of claim 17, wherein the target tissue is at increased risk of damage.

Claims 27-28 (Cancelled)

Claim 29 (New): The method of claim 17, wherein said physiological stimulus-sensitive chimeric transactivator is oxygen-sensitive and comprises a GAL4 DNA-binding domain (DBD), a oxygen-dependent degradation domain (ODD), and a p65 activation domain (p65 AD); and wherein said second polynucleotide further comprises a GAL4 upstream activating sequence (UAS) linked to said nucleic acid sequence of said second polynucleotide, and wherein in response to hypoxia, said

transactivator binds to the GAL4 UAS, resulting in expression of said nucleic acid sequence encoding said stem cell-attracting chemokine.

Claim 30 (New): The method of claim 17, wherein said tissue-specific promoter is specific for expression in a tissue selected from the group consisting of kidney, epithelial tissue, endothelial tissue, liver, brain, neural tissue, thymus, and pancreas.

Claim 31 (New): The method of claim 17, wherein said tissue-specific promoter is selected from the group consisting of CLCN5, rennin, androgen-regulated protein, sodium-phosphate cotransporter, renal cytochrome P-450, parathyroid hormone receptor, kidney-specific cadherin, E-cadherein, estrogen receptor (ER) 3, endoglin, ICAM-2, human phenylalanine hydroxylase (PAH), human C-reactive protein (CRP), human enolase (ENO3), thy-1 antigen, gamma-enolase, glial-specific glial fibrillary acidic protein (GFAP), human FGF1, GATA transcription factor, and pancreas duodenum homeobox 1 (PDX-1).

Claim 32 (New): The method of claim 17, wherein said tissue-specific promoter is a cardiac-specific promoter.

Claim 33 (New): The method of claim 17, wherein said tissue-specific promoter is a cardiac-specific promoter selected from the group consisting of the ventricular form of the MLC-2v promoter, a fragment of the native MLC-2v promoter, alpha myosin heavy chain promoter, and myosin light chain-2 promoter.

Claim 34 (New): The method of claim 17, wherein said stem cell-attracting chemokine is selected from the group consisting of SCF, vascular endothelial growth factor (VEGF), granulocyte colony-stimulating factor (G-CSF), an integrin, and hSDF-1alpha.

Claim 35 (New): The method of claim 17, wherein said stem cell-attracting chemokine comprises hSDF-1alpha.

Claim 36 (New): The method of claim 17, wherein said physiological stimulus is associated with cell injury.

Claim 37 (New): The method of claim 17, wherein said physiological stimulus-sensitive chimeric transactivator is sensitive to hypoxia or an elevated glucose level.

Claim 38 (New): The method of claim 17, wherein the stem cell attracted by said stem cell-attracting chemokine is from an anatomical site selected from the group consisting of bone marrow, peripheral blood, brain, spinal cord, dental pulp, blood vessels, skeletal muscle, epithelia of the skin, epithelia of the digestive system, cornea, retina, liver, and pancreas.

Claim 39 (New): The method of claim 17, wherein said composition is a recombinant viral vector.

Claim 40 (New): The method of claim 17, wherein said composition is a recombinant viral vector selected from the group consisting of an adenovirus, an adeno-associated virus, a herpes simplex virus, a lentivirus, and a retrovirus.

Claim 41 (New): The method of claim 17, wherein said composition is a recombinant adeno-associated viral vector.

Claim 42 (New): The method of claim 17, wherein said composition is a non-viral vector.

Claim 43 (New): The method of claim 17, wherein said composition is a plasmid.

Claim 44 (New): The method of claim 17, wherein said method further comprises co-administering to the target tissue stem cells and an agent that causes stem cells to migrate to the target tissue.

Claim 45 (New): The method of claim 29, wherein said second polynucleotide further comprises a TATA element.

Claim 46 (New): The method of claim 29, wherein said second polynucleotide comprises at least two copies of said GAL4 upstream activating sequence (UAS).